Expansion and Warfare among Swidden Agriculturalists[1]

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IN SPITE of the growing recognition that "ecological factors always affect cultural patterning and social organization" (Forde 1948:9), these factors have tended to be slighted in investigations of primitive warfare. Even Julian Steward, an anthropologist who has contributed notably to ecological studies, has interpreted what he calls "bloodthirsty primitive patterns of warfare" as being means of release for pent-up aggressions rather than being expressions of competition for resources or being in some other way ecologically determined (Steward 1958:207–208).

While Steward has tried to support his interpretation by reference to the Tupinamba Indians of the tropical forest in Brazil, Murphy (1957) has recently made an analysis along similar lines with special reference to another Brazilian Indian group, the Mundurucú. Murphy has described the warfare of these people as a "safety-valve institution" (p. 1032), has denied that it had territorial conquest as a goal (p. 1027), or that it was due in any appreciable degree to the "pressure of external circumstances" (p. 1028), and has concluded that warfare in general is "an especially effective means of promoting social cohesion in that it provides an occasion upon which the members of the society unite and submerge their factional differences in the vigorous pursuit of a common purpose" (p. 1034). Rather similarly, Wedgwood (1930:33) has interpreted Melanesian warfare as serving the "double purpose of enabling people to give expression to anger caused by a disturbance of the internal harmony, and of strengthening or reaffirming the ties which hold them together." While Wedgwood herself has not explicitly denied the operation of ecological factors, Wright (1942:71–73), drawing upon her discussion, has concluded that primitive warfare "functions primarily" to maintain the solidarity of the social group and that many of the Melanesians fought "without economic or political objectives or consequences."

It may of course be argued that a group's survival and prosperity depend *inter alia* upon the group's solidarity (cf. White 1959:103) and therefore anything that maintains or promotes solidarity does indirectly have economic or ecological consequences. However, we know that the solidarity of peoples throughout the world has been achieved by many means other than warfare. It has been achieved through ceremonies, through games—through a very large variety of customs (cf. White 1959:215). Therefore it seems doubtful that the solidarity of any particular people should be attainable only through warfare, which is a means having such maladaptive or dysfunctional effects as the loss of life, the considerable diversion of time and effort from productive activities, etc. On the assumption that culture tends to be adaptive in the sense of providing people with the means of adjustment to the geographical environment and to the other basic conditions of life (cf. Murdock 1959:131), we should expect warfare to serve people in more ways than merely through providing them with solidarity or cohesion and we should expect, furthermore, that the other functions of warfare will tend to offset the maladaptive consequences of fighting. In other words, we have grounds for expecting the primitive hostilities of the types discussed by Steward, Murphy, Wedgwood, and Wright to have more direct ecological functions or consequences than those deriving from the attainment of social solidarity.[2]

In saying this, I do not mean to say that wherever warfare exists it must be useful. Obviously we must allow for the possibility that a people whose survival and/or increase has been promoted by warfare in the past will go on fighting even if, under changed conditions, warfare no longer functions for them as it had. At the same time we may regard it of some heuristic value to argue that wherever warfare exists it is likely to have been useful or adaptive (in the sense of being more advantageous than disadvantageous) at some time in the course of its development. My interpretations in this paper have been made with this proposition in mind.

The procedure in this paper will be to consider some ecological factors that may affect warfare in social and environmental settings similar to those in which the warfare of the Tupinamba, the Mundurucú, and some of the Melanesians was carried on. Two models of warlike expansion will be presented. This will be done with special reference to the Maoris of New Zealand and the Ibans of Sarawak. It must be emphasized that the models to be presented are models of expansion. For populations that are not expanding, other models would be appropriate and we would have to consider such possible functions of warfare as the adjustment of male-female ratios through the occasional capture of women and children (cf. Oberg 1955:473–474; Zegwaard 1959:1036), the spacing out of relatively stable populations within finite territories (cf. Suttles 1959), and the prevention of population increase so great as to lead to an overexploitation and deterioration of resources (cf. Allan 1949:26; Cook 1946).

I

Although such warriors of Oceania and the South American tropical forest as have been discussed by Steward and the other authors cited above have gained fame largely for being head-hunters or cannibals or torturers, it is something else about them that seems particularly significant to me. This is the fact that most of them practice slash-and-burn or swidden agriculture, a system of cultivation which may be defined, in Conklin's (1954:133) words, as "always involving the impermanent agricultural use of plots produced by the cutting back and burning off of vegetative cover." In various discussions of Maori warfare (e.g., Vayda 1956; 1960), I have already given some consideration to ways in which the practice of swidden agriculture may influence the practice of war. In some parts of New Zealand, the Maoris were swidden agriculturalists (cf.

N. H. Taylor 1958:76; R. Taylor 1870:494), and, like other primitive swiddeners equipped with only wooden and stone tools (cf. Drucker and Heizer 1960:39–40; Goodenough 1956:174–175), they found it very much harder to clear primary forest (true rain forest in the case of New Zealand) than to clear second growth. In light of this, I have argued that Maori groups needing more land may have preferred getting previously used land from other groups, by force if necessary, rather than expanding into the virgin rain forest. If the time and effort required for clearing virgin land were considerably more than were necessary for the operations of both conquest and the preparation of previously used land for cultivation, it follows that territorial conquests, such as some of those recorded in Maori traditional history, would have added more efficiently to the prosperity of particular groups than would peaceful dispersion.

While this argument, first published in 1956, still seems acceptable to me, it can now be amplified somewhat by considering some features of social organization.

Maori population was organized into nonunilineal nonexogamous descent groups (cf. Davenport 1959; Firth 1957). In late 18th century New Zealand there were 100,000 to 300,000 Maoris distributed among roughly 40 tribes or *iwi*, most of which were subdivided into numerous subtribes or *hapu*. The members of a hapu were consanguineal relatives who could trace their descent from a common ancestor several generations back; the members of each of the related hapu constituting a tribe could trace their descent back to a single ancestor of all the tribesmen. The average Maori village community may be very roughly estimated to have contained a few hundred people. A village community was ordinarily regarded as belonging to a single hapu, and marriages between members of a hapu were frequent and were considered desirable. It was from small beginnings in an early settlement period that the 18th century population of 100,000 to 300,000 Maoris had developed. In the course of population growth, the descent groups, both hapu and iwi, had proliferated.

It must be conceded that the increase in population and in the number of descent groups could have taken place peacefully while tribes or subtribes were able to expand into virgin land adjoining areas already under their exploitation. However, sooner or later there would have been groups whose territory adjoined only the territory of other groups rather than any virgin land suitable for agriculture. If *these* groups were to expand their holdings without abandoning any of their own land and without taking over that of other groups, they would have had to colonize new land separated and possibly quite distant from their existing territory. In such new land, the position of the colonists could be extremely insecure because in Maori society only the closer categories of kinsmen could be relied upon fairly consistently for cooperation in the tasks of subsistence and defense. The colonists would need help for clearing the land, a task characteristically performed among the Maoris by working bees called *ohu*, comprised sometimes of more than forty men (cf. Best 1925:101–102; Buck 1949:378; Firth 1929:219–220). But at the time when the colonists would most need this help, their close kin might be far away, busy with agricultural labors in the home territory. Neighbors of the colonists would be distant kin or nonkin and not likely to want to give aid. If somehow the colonists would nevertheless manage to perform the clearing operations, they would be making what Goodenough (1956:175) has termed a "significant capital gain," and the cleared land would be an attractive prize for the colonists' nonkin or distant kin neighbors whose own numbers might be increasing. The colonists would lack the manpower and would have no nearby close kin to appeal to for defense of their new territory.

This whole chain of events is hypothetical. Let us consider now another possibility: expansion by means of taking over the territory of other groups. We know that conquests involving displacement of the vanquished foe from their territory did in fact occur in pre-European New Zealand (cf. Vayda 1956), although we do not know exactly how they occurred. The process could have taken place among the kinship-organized, genealogy-conscious Maoris very much as it did among the Tiv of West Africa. The latter people cultivate yams and other crops in savanna country in Northern Nigeria, and their recognized technique for the expansion of land holdings was, as described by Bohannan (1954:5), a simple one:

> . . . always, when you make new farms, clear land towards that man whose land bounds yours, but who is most distantly related to you. When he objects, you are thus assured of the largest possible supporting group in any litigation, argument, or fight which may develop, since all the people who are more closely related to you than to him will come to your aid instead of his.
>
> Thus, to ensure the support of one's entire minimal segment [corresponding to the Maori hapu], one expands one's holdings against the territory of the companion minimal segment. To ensure the support of both these minimal segments, one expands against the territory of a genealogically more distant lineage.

The expansion of the Tiv in all directions was still going on during Bohannan's term of field work. Unfortunately the student of Maori culture does not have the same opportunities for observing the process of expansion as Bohannan had. Yet there are indications that the process among the Maoris not only could have been but actually *was* similar in some significant respects. The influence of considerations of genealogical proximity in determining to whom aid would be given is shown, for example, in Polack's eye-witness account of fighting between two hapu of the Nga Puhi tribe in 1837. Polack (1838:42) mentions that the Hokianga natives, arriving after the hostilities had begun, were sorely puzzled which of the two parties to join, as they were *equally* related to both of them.[3] Consistent with a Tiv-like process of expansion are the Maori conditions described summarily by Firth (1929:371) as follows:

> The general position seems to have been that the various major *hapu* of the tribe safeguarded their lands very carefully against one another, that trespassers or food poachers were severely punished or even killed, and that warfare, involving considerable loss of life, not infrequently arose among them from disputes about land. At the same time the *hapu* would unite to protect the interests of any one of them against forces from outside the tribe.

A process of territorial expansion with the support of the more closely related people or groups against the less closely related and the unrelated would have obviated the hypothetical problems that have previously been described for Maori colonists in virgin territory. The process must be envisaged as involving something like a chain reaction. The expansion of group A into the contiguous territory of group B might lead group B to expand into the contiguous territory of group C—and so forth until finally there would be a displacement of a group having territory contiguous to virgin land. If members of this last group were to settle in the virgin territory, they might do this without having to give up having neighbors who were close kin, i.e., neighbors who could be called upon for aid in subsistence and defense.

It should not be inferred from this discussion that every permanent enlargement of a particular group's territorial holdings would have led ultimately to an expansion into virgin territory somewhere in New Zealand. The chain reaction in the redistribution of population upon the land might stop short of this if there were heavy loss of life in the hostilities attendant upon attempts at expansion. For example, group A might kill so many members of group B in the process of taking over some of the latter's land that the land remaining to group B could sustain its surviving members and, moreover, group B might be too weak to become the successful aggressor against some other group. The evidence on battle mortality which I have marshalled elsewhere (Vayda 1960) suggests that something like this did happen sometimes, although at other times the chain reaction ended only with the occupation and exploiting of previously unexploited or underexploited land.

We have here then our first model of warfare among swidden agriculturalists, and it is a model in which warfare has such direct ecological functions or consequences as the expansion of population and an increase in the extent of the environment being exploited.

It is reasonable to ask how closely this model approximates warfare among various other swiddening people. Unfortunately the question is not answerable on the basis of the data that I have found it possible to examine. No doubt there are some groups on whom no more than sparse data are available anywhere and therefore no definite answer about them can ever be given. However, with regard to the Tupinamba referred to by Steward, even the limited facts at my disposal make it seem unwarranted to conclude that the warfare of these Brazilian Indians had no ecological functions or consequences. We know that the population of the Tupinamba was increasing (Fernandes 1952:64), that their various tribes and local communities were often at war with one another (Métraux 1948:119), that their hostilities could lead to displacements of the vanquished from their lands (Fernandes 1952:60–63), and that the Tupinamba seem to have dispersed over a large area from a common center and to have ended their movements only in the second half of the 16th century (Métraux 1948:97). All of these facts are congruent with my first model of warlike expansion and may be congruent also with other models in which warfare has direct ecological functions or consequences.

II

One other model will be described: a model in which there is relative intratribal peace as a contrast to the recurrent intratribal as well as extratribal hostilities that characterize the first model. This second model will be discussed with special reference to the Ibans of Sarawak.

We cannot say that there was no intratribal warfare at all among the Ibans, for there are a few scattered references (e.g., Brooke 1866:I, 145–146) to hostilities between neighboring and closely related Iban villages. It seems to have been more common and more characteristic, however, for members of one Iban tribe to fight either against members of other Iban tribes or against non-Ibans. Freeman (1955a:53) has recently defined what a tribe was among the Ibans:

> The tribe, we may say, is a diffuse territorial grouping dispersed along the banks of a major river and its diverging tributaries. Formerly, it was a grouping whose members did not take one another's heads, but with pacification and the abandonment of head-hunting, tribal boundaries have become blurred. The tribe is still a predominantly endogamous group however, and is intricately reticulated by ties of bilateral kinship. A tribe is perhaps best described then, as an interlocking aggregation of kindreds, and in the widest sense all its members are kith and kin, of common, albeit remote ancestry.

It should be noted that the reasons for the Ibans having little intratribal warfare may have been ecological as well as social. Distances between the village communities of the Ibans may have been shorter than between the village communities of other primitive swiddeners such as the Maoris. Freeman (1955a:27; 1955b:8) says that Iban long-house communities are encountered about once in every two or three miles throughout the Baleh region of Sarawak and that sometimes, although not often, they are found even within hailing distance of one another. My impression, set forth in somewhat more detail elsewhere (Vayda 1960), is that the distances in miles between Maori villages usually were very much greater.

It is necessary to take into account not only the distances in miles but also pheric distances, i.e., distances measured by the time required for covering them (cf. Andrzejewski 1954:191). Freeman (1955b:8) mentions that all Iban communities are situated on the banks of rivers or streams navigable by dugout canoes. The Maoris, on the other hand, lived in a habitat characterized by a rough topography and an often impenetrable rain forest and their canoe traveling was severely limited by difficult portages and turbulent waters. It seems very likely that pheric distances between Iban communities tended to be shorter than between the Maori villages.

In any case, regardless of whether or not it was due at least partly to ecological factors, there seems to have been considerable intervillage mobility among the Ibans. Their communities were, and apparently still are, linked together by what Leach (1948:92) has called "innumerable ties of affinal kinship at all social levels." Freeman (1958) has described in detail how the small autonomous family groups occupying individual apartments in the Iban longhouses can lose members, female as well as male, both through their marriage into other families and through their departure to set up their own autonomous domestic units. It should be remarked also that the incentives of material profit and social prestige stimulate Iban young men to try to spend at least six months of every year in making journeys, sometimes inland for the collection of gutta-percha and other jungle produce, sometimes seawards, sometimes even to distant parts of the Indies. Going on expeditions, including ones for head-hunting in former days, is said to be the greatest and most consuming interest that Iban young men find in life (Freeman 1955b:74–75; cf. Anonymous 1885:114).

Not only individuals but also the family groups themselves, called *bilek* families by Freeman, were mobile. Freeman (1955a:32) states that a bilek family, as an autonomous unit, might join any of the various long-house communities where kith or kin were already members. He goes on to say:

> . . . *bilek-families* often set off, either singly, or in twos or threes, to attach themselves to some long-house, the situation of which they considered especially advantageous. Provided certain essential ritual formalities had been observed, a *bilek-family* was free to leave one long-house, and join another, whenever it desired. Such independent movement was frequently resorted to, and when a whole community decided to shift to a new territory, it was seldom, if ever, that all its *bilek-families* remained together. Although the majority usually continued their old association, almost always some would detach themselves, and disperse to separate destinations (Freeman 1955a:32–33).

One further fact that remains to be underscored in this account of the mobility of the Ibans is that not only was there apparently considerable movement between Iban communities but also there were periodical shiftings of the very community sites. Freeman (1955b:32ff.) describes in detail the abandoning of settlements by the Ibans.

The point of this discussion of Iban mobility and of ecological and social factors promoting it is the implication that there were effective nonwarlike ways and means whereby population could be moved about or redistributed within the total territory of each Iban tribe. It seems likely that there need have been no very serious intratribal conflicts over land as long as substantial cultivable land was available somewhere within the tribal area. When population pressure was felt locally, there were other parts to which some Ibans could move.

This, however, suggests that an important condition of peace within the tribe was precisely this availability of cultivable land somewhere within the tribal territory. It follows that if the original tribal territory was relatively small and the population was increasing, then peace within the tribe could require an enlargement of territory, by means of war against other tribes if necessary. We have here then our second model of warfare and expansion among swidden agriculturalists: intratribal peace and mobility plus wars of territorial conquest against other tribes.

Available facts about the Ibans fit this model. That their population was expanding is indicated by Charles Brooke, who wrote as follows in the 1860's:

> To offer one instance of the multiplying process, I will mention the upper Batang Lupar river, which has now a population of eighteen or twenty thousand souls residing on it, and has emitted a supply, about fifty years ago, to a neighbouring stream (a tributary of Rejang), from which a population has now increased to from ten to twelve thousand souls, without the aid of any intermixture from other directions. Many other instances might be adduced of a similar nature, which have come under my immediate observation (Brooke 1866:II, 336).

According to Hose and McDougall (1912:188), Iban settlements before the

19th century were practically confined to the rivers of the southern part of Sarawak. The basin of the great Rejang River was inhabited at this time by the Kayans, Kenyahs, Punans, Ukits, and other non-Iban tribes, and, says Freeman (1955b:11), there were probably no Ibans living north of the southern watershed of the Rejang basin (cf. Richards 1949:79ff.; 1958:126). Today, according to Freeman, there are more than 114,000 Ibans settled in areas north of this line. These people constitute more than one-fifth of the total population of Sarawak and more than three-fifths of the entire Iban population of the country. They had driven the other people away (cf. Freeman 1955b:25–26 note).

Some further comments about mobility in connection with the second model are in order. It has to be noted that for the Ibans there was very considerable mobility outside as well as within the tribal territories. "Before the advancing Iban," says Freeman (1955b:25), "there lay thousands of square miles of deserted, or extremely sparsely populated, rain-forest. On their head-hunting forays Iban bands had penetrated into the remote headwaters of the Rejang, Kayan, Mahakam, and Kapuas rivers, and the vast extent of the territories which extended before their tribe was well enough known." The accessibility of these extra-tribal regions, both because of strictly geographical factors and also because of their not being densely populated, provides a contrast to conditions found in such areas of highland swiddening as Northern Luzon, central New Guinea, and the Naga Hills of Assam. In these latter areas, and to some extent also in such areas as New Zealand (see the discussion in Sharp 1956:130), mountain ridges are barriers to mobility, and, furthermore, as soon as the valleys between the ridges have become thickly settled, there can be demographic barriers to mobility as well. "Mountain province groups in Northern Luzon," writes Conklin (1959), "could not retreat or advance over hundreds of miles in any direction, because in the next valley, on all sides, lived potential or actual enemies." Iban warfare had something of a pioneering character. The young men, whose agricultural activities could be confined to felling the jungle during one or two months of the year, forged far ahead of the main body of settlers. In doing this, they learned about the land and drove from it the other tribes that had some claim to it. It may be that considerable mobility outside as well as within the tribal territories is a requirement of the kind of warlike expansion that the Ibans exemplify.

A few additional points about the ecological setting of warlike expansion as described in my second model can be made. We sometimes find in the anthropological literature (cf. Fathauer 1954:117; Murphy 1957:1027, 1028) statements implying that in order to show significant economic, ecological, or demographic influences upon warfare it is necessary to show that the warring people exist within a given territory in numbers either almost as great as, or as great as, or possibly even greater than the numbers that the territory can continue to support under a given system of exploitation. In contrast to these statements, we have Birdsell's (1957:54) observation, made in a discussion of generalized hunting and collecting populations, that it is untenable to assume that a native population would begin to colonize adjacent favorable and unspoiled territories only when its existing territories attain a maximum carrying capacity. According to Birdsell, "even among horticultural peoples the environmental stimuli of a slowly reducing food supply *per capita* begin to exert important pressures for escape from the approaching equilibrium at considerably lower levels." Our Iban case is instructive because it shows the warlike extension of territory as a means whereby a group can *avoid* experiencing any very great privations due to the pressure of population upon available resources. Iban men, in their headhunting forays during what for them was the agricultural slack season, were pioneering some areas which might not be "needed" or even brought into agricultural use by the growing Iban population until years later. This very pioneering may have been an important precondition for relative peace within each Iban tribe and for its having a mobile labor force for exploiting the environment, for it would be a factor tending to obviate those situations of potential conflict in which some Iban tribesmen had enough land for their needs while others did not.

Inasmuch as an estimate based upon a recent census (cf. Noakes 1950:17) gives a mean population density of less than twelve people per square mile for all of Sarawak, it may of course still be asked why the Ibans in the last century, when their numbers were smaller than now, should have taken land claimed by other tribes. If Iban population was increasing, then why did it not spread peacefully into virgin territory not claimed by anybody? In answer to this, it must be noted that some land is better suited than other land for exploitation by a people with given techniques and a given organization. Thus it may be the case that for swidden agriculturalists in the humid tropics in general it is advantageous to farm in second-growth land rather than in primary forests, which, at least in the humid tropics, may be almost as difficult to clear with iron tools as with wooden and stone ones (Goodenough 1956:174–175; cf. Conklin 1954:137, 140). This may have been true of the Ibans, notwithstanding that Freeman (1955b:111, 115, 117–118) attributes a preference for virgin forest to them. This preference is also something that may have promoted peace within the Iban tribes—by virtue of stimulating the younger and hardier people to settle the more recently pioneered areas and not to vie unduly for land in the old areas. It should be noted also that for the younger and hardier people the virgin forest may have seemed more attractive because of the greater possibilities there for the collection of jungle produce. However, as Freeman (1955b:22, 113, 120ff.) himself makes clear, the preference for virgin forest was neither so general nor so intense among the Ibans as to induce them to allow second growth to revert to climax vegetation. Leach (1950:89), writing of Sarawak, has stated that in "most normal circumstances the total amount of virgin jungle cleared in any one year is almost infinitesimal," and it seems warranted to conclude that the relative ease of clearing second growth may well have been a factor in the Ibans taking previously farmed land from other groups at times rather than expanding into virgin territory.

However, much of the land that the Ibans took from other groups was only very sparsely inhabited and no doubt some of it had not been previously cultivated or else had been allowed to revert to climax vegetation. It seems likely that its riverine location made even such land more suitable for Iban use than virgin territory elsewhere would have been. Throughout most of Sarawak, as in many other parts of the humid tropics, human occupation has taken the form of ribbon development along the banks of the rivers, which, for the Ibans, were important, not only for getting to the rice fields (cf. Hose and McDougall 1912:131) and probably for facilitating movement between communities of the same tribe so as to enable people to cooperate more effectively in military undertakings, but also for providing access to trade goods. By using the rivers for taking rice, gutta-percha, and other products to the Chinese and Malay traders (or by being on the rivers so that the traders could come to them), the natives of the interior could get not only the treasured brassware and ceramics (cf. Freeman 1955b:76–77) but also guns (cf. Cunynghame 1892:77; Grant 1885:117; Maxwell 1881:87) and the bars of European iron and steel from which were fashioned essential agricultural and fishing implements (chopping knives, fish spears, etc.) and the swords and spears used in fighting (cf. Hose and McDougall 1912:193ff.; Low 1848:158, 209–211). It may be suggested that the readier the access to trade goods the more efficient would be the economic and military system and, furthermore, that by spreading aggressively along the rivers as Iban population was increasing, the Ibans were probably maintaining the conditions (including the relatively ready access to trade goods and the facility of intercommunity cooperation) under which further increase in numbers remained feasible for them.

We see then that the type of warfare exemplified by the Ibans, as well as the other type described with special reference to the Maoris, may have important ecological functions or effects. Conclusions about the "primary functions" of warfare among any swiddening people are likely to be premature until substantial data on the populations and environments in question have been examined in the light of such models as I have presented in this paper and in the light of other models as well.

NOTES

[1] An earlier version of this paper was presented at the Northwest Anthropological Conference at Portland State College in Portland, Oregon, on April 18, 1959. Helpful comments on one or another of my preliminary drafts were received from Paul Bohannan, Robert Carneiro, Harold Conklin, Gertrude Dole, Ronald Dore, Marvin Harris, Edmund Leach, Anthony Leeds, Frederick Lehman, Lorenz Löffler, Robert Murphy, Raoul Naroll, Marshall Sahlins, David Smith, Wayne Suttles, Eric Wolf, and my students in a seminar on warfare at the University of British Columbia. Not all of these persons agree with my interpretations and point of view. To the Social Science Research Council I am indebted for a grant-in-aid that enabled me to do research in England on Borneo warfare.

[2] Some brief remarks upon my use of such terms as "consequences," "effects," "results," etc. may be in order here. It should be understood that in using the terms I do not have in mind one-way linear cause-to-effect sequences. I think it is necessary to recognize that there are "feedbacks" from effects to causes, that the adaptiveness of an effect—its contribution to the survival

and well-being and perhaps also the increase of people—favors the continuation and spread of the motives and actions leading to the effect. The same ecological phenomena may be both consequences and determinants. With special reference to the study of the "causes" of war, I have discussed more fully in another place (Vayda 1959) the circular relations between effects and causes.

[3] L. Bohannan (1958:46) refers to a parallel contretemps among the Tiv: "MbaDigam . . . being equally related to the warring segments MbaGishi and MbaTyende, could come to the help of neither without repudiating its relationship with the other. MbaDigam took the only possible course—peacemaking."

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